REPORT DOCUMENTATION PAGE

Form Approved
OMB No. 0704-0188

1. REPORT DATE *(DD-MM-YYYY)*	2. REPORT TYPE	3. DATES COVERED *(From - To)*
23-02-2005	Final Report	July 2004 to July 2005

4. TITLE AND SUBTITLE
Improving the Patient Discharge Process to Optimize Patient Throughput in an Academic Teaching Hospital & Level I Truama Center

5a. CONTRACT NUMBER

5b. GRANT NUMBER

5c. PROGRAM ELEMENT NUMBER

6. AUTHOR(S)
S. Erin Elarton, Capt, USAF, MSC

5d. PROJECT NUMBER

5e. TASK NUMBER

5f. WORK UNIT NUMBER

7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)
Ben Taub General Hospital
1504 Taub Loop
Houston, TX 77030

8. PERFORMING ORGANIZATION REPORT NUMBER

9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)
U.S. Army Medical Department Center and School
BLDG 2841 MCCS-HFB (Army-Baylor Program in Healthcare Administration)
3151 Scott Road, Suite 1411
Fort Sam Houston, TX 78234-6135

10. SPONSOR/MONITOR'S ACRONYM(S)

11. SPONSORING/MONITORING AGENCY REPORT NUMBER
34-05

12. DISTRIBUTION AVAILABILITY STATEMENT
Approved for public release; distribution is unlimited

13. SUPPLEMENTARY NOTES

14. ABSTRACT
Limited resources and capacity constraints force Ben Taub General Hospital (BTGH) to optimize patient throughput in order to minimize Emergency Center overcrowding and ambulance diversions. The purpose of this study was to identify impeding systematic delays in the patient discharge process, quantify the extent of the delays, and recommend performance improvement initiatives for the BTGH to expedite bed turnaround times. A pilot study was conducted on two medicine and two surgery inpatient nursing units to analyze bed turnaround times and discharge times of day. The results revealed that only 12% of all discharges occurred before noon, the industry standard. The results indicated numerous opportunities for improvement exist throughout the discharge process that may have a profound impact on overall patient flow through BTGH.

15. SUBJECT TERMS
patient discharge, patient throughput, bed turnaround, ambulance diversion

16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT	18. NUMBER OF PAGES	19a. NAME OF RESPONSIBLE PERSON
a. REPORT	b. ABSTRACT	c. THIS PAGE	UU	43	S. Erin Elarton, Capt, USAF, MSC
U	U	U			19b. TELEPONE NUMBER *(Include area code)* (713) 873-8867

Running Head: Patient Discharge Process

Improving the Discharge Process to Optimize Patient Throughput in an Academic Teaching Hospital & Level I Trauma Center

Captain S. Erin Elarton, USAF, MSC

U.S. Army-Baylor University Graduate Program in Healthcare Administration

22 February 2004

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The views expressed in this article are those of the author and do not necessarily reflect the official policy or position of the Air Force, Department of Defense, or the U.S. Government

Acknowledgements

I would like to extend my sincere gratitude to my preceptor, Mr. Terence Cunningham, Administrator, Ben Taub General Hospital (BTGH), for providing helpful guidance and ensuring my progress on this project. Thank you to the BTGH executive leadership who identified a need for this study: Mr. George Masi, Associate Administrator; Ms. Beth De Guzman, Chief Nursing Officer, and Dr. Kenneth Mattox, Chief of Staff. I am greatly appreciative to numerous members of the BTGH staff for educating me on the discharge process and the challenges they face with regards to facilitating patient flow: Ms. Barrett, Patient Flow Coordinator; Ms. Mosley, Nursing Supervisor; Ms. Bush, Nurse Manager (Unit 6A); Ms. Lyu, Nurse Manager, (Unit 6B); Ms. Okoro, Nurse Manager (Unit 4A); Ms. Dale, Nurse Manager (Unit 4B); Ms. Andrea Hoyes, Clerk (Unit 4A); Ms. Hensley, Bed Management; Mr. Kahn Outpatient Pharmacy, Mr. Smith, Emergency Center Pharmacy; Mr. Mosley & Mr. Stuart, Environmental Services; Ms. Taylor & Ms. Stevenson, Discharge Holding; Ms. Sharpe, Mr. Ceron, & Ms. Lukose, Case Management; Ms. Waller & Ms. Dunbar, Laboratory; Ms. Albert, Transportation; Ms. Banerji and her medical records staff; Ms. Posey & Ms. Toronjo, Information Management. Thank you Lieutenant Colonel Yap, Assistant Professor, U.S. Army-Baylor University, for providing valuable and timely feedback on the proposal and project.

Abstract

Limited resources and capacity constraints force Ben Taub General Hospital to optimize patient throughput in order to minimize Emergency Center overcrowding and ambulance diversions. The purpose of this study is to identify impeding systematic delays in the patient discharge process, quantify the extent of the delays, and recommend performance improvement initiatives for the BTGH to expedite bed turnaround times. A pilot study was conducted on two medicine and two surgery inpatient nursing units to analyze bed turnaround times and discharge times of day. The results revealed that only 12% of all discharges occurred before noon, the industry standard. The results indicated numerous opportunities for improvement exist throughout the discharge process that may have a profound impact on overall patient flow through BTGH.

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Introduction

According to the Greater Houston Partnership, Public Health Finance Committee (2004, July) approximately 3.70 million people reside in Harris County, Texas. An estimated 29.55 percent of this population is uninsured (2004). Fortunately, for these citizens who have no ability to pay for healthcare, they have access to medical care through the Harris County Hospital District (HCHD). However, the overwhelming number of uninsured citizens generates numerous challenges for the safety net hospitals within Harris County.

The HCHD is the nation's fourth largest metropolitan public health system (Harris County Hospital District Corporate Communications, 2004). Ben Taub General Hospital (BTGH), one of the HCHD's two major hospitals, is a Level I Trauma Center and academic teaching facility with 647 licensed-beds. BTGH provides over 40 medical and surgical specialties and 588-staffed inpatient beds (Ben Taub General Hospital & Quentin Mease Community Hospital, 2003). Considering the 1.9 million uninsured people residing in Harris County and many more underinsured or undocumented persons, BTGH sees a constant flood of patients presenting to its Emergency Center (EC) (Greater Houston Partnership, Public Health Finance Committee, 2004). In FY 2003, BTGH's EC provided for 100,256 emergency visits (Harris County Hospital District, 2003). Approximately 80 percent of BTGH's inpatients

are admitted through its EC (HCHD Corporate Communications, 2004). This high rate of admissions from the BTGH EC can cause overcrowding in the EC if patients requiring hospitalization are unable to be admitted in an efficient manner. Excessive congestion in the EC can lead to the diversion of Harris County ambulance services.

One way the BTGH adult EC can go on diversion as a result of EC saturation due to the inability to admit patients because no open beds are available on inpatient nursing units. From January 1, 2004 through September 30, 2004, BTGH was on ambulance diversion (due to no open floor beds) for a total of 486 hours and 33 minutes (Keys, 2004). In fiscal year 2003, BTGH's adult and pediatric services averaged 78.36 percent occupancy (Harris County Hospital District, Feb 2003).

BTGH strives to meet its communities demanding healthcare needs and makes every attempt to avoid ambulance diversions, but limited financial and personnel resources, along with its high utilization and occupancy rates, makes it difficult to curb ambulance diversion altogether. In order to avoid initiating ambulance diversions, BTGH must optimize patient throughput and maximize efficient systematic processes to limit potential bottlenecks. A very critical piece to optimizing patient throughput in an acute care hospital like BTGH is the timing and execution of patient discharges. BTGH inpatients must be discharged in a timely manner in order to

open beds for the constant influx of patients waiting in the EC to be admitted. The consequences of not expediting inpatients who are identified for discharge can be a huge financial burden on the organization considering the high cost of hospitalization (Health Management Associates, 2004). It is the goal of executive administration at BTGH to ensure that an efficient and effective discharge process is in place to optimize patient throughput, patient satisfaction, and employee satisfaction.

Conditions that Prompted the Study

A three-day time and motion study of the BTGH discharge process was conducted in April 2004 on two medicine inpatient nursing units. This study specifically analyzed the length of time between events of the discharge process. During this study, the average discharge order was written at 11:42 AM with the patient vacating the bed at 2:38 PM, leaving the bed available for admission at 3:45 PM (Larsen, 2004). Numerous process improvement opportunities were identified for future study: discharge planning, laboratory blood draws, physicians' rounding times, preplanning and proactiveness of unit nurses and clerks, pharmacy, patient transportation, discharge holding area, and housekeeping bed turnaround times.

Statement of the Problem

EC ambulance diversions and capacity constraints necessitate the need for BTGH to reevaluate its discharge

process to facilitate expediting patient throughput, ultimately creating a streamlined, efficient healthcare system. BTGH must optimize its patient discharge process to help maximize patient throughput, alleviate patient placement delays, and eliminate EC ambulance diversions. Failure to pre-plan discharges as early as the time of admission often results in delayed discharge times and frustrated staff and patients. A systematic approach analyzing inputs from physicians, nurses, clerks, pharmacists, phlebotomists and case managers is necessary to alleviate delays in processing patient discharges.

Literature Review

It is the ultimate goal of any acute care hospital to provide the highest quality healthcare, while effectively restoring its patients to optimal health and efficiently returning them to their normal daily routine. Decreasing the average length of stay in an acute care hospital is both satisfying to patients and keeps medical costs per patient at a minimum. For a safety net hospital like BTGH, this goal can be quite challenging considering the unique health conditions and socio-economic status of its patient population.

To achieve efficiency in a healthcare setting, patient movement must be critically analyzed. Improving patient throughput is a major hospital-wide project that requires continuous process improvement and the coordination of

numerous departments and functions in order to streamline the entire throughput process. Patient throughput is a critical issue that directly impacts patient safety and quality. The Joint Commission on Accreditation of Healthcare Organizations recently developed a new standard requiring hospital leadership to "develop and implement plans to identify and mitigate issues in a hospital that can interfere with efficient movement of patients across the continuum of care within an organization" (Joint Commission on Accreditation of Healthcare Organizations, 2004).

Moving patients efficiently and effectively through a healthcare system can also optimize an organizations' capacity. Research conducted by The Advisory Board (Smith, 2003) reported that a comprehensive approach to patient throughput could yield nearly 25 percent more effective capacity for the average hospital. "At midday, census for an average hospital can be up to 30 percent higher than at midnight. Accelerating patient placement and discharging patients earlier in the day can significantly impact hospital capacity" (2003).

Every point along the patient care continuum from initial assessment to discharge can either expedite or impede patient flow. The key to improving patient flow is to minimize variation in the hospital's processes, to eliminate any redundant or unnecessary steps and monitor any roadblocks that

delay expedient discharges. Discharging a patient from an inpatient nursing unit requires a certain sequencing of events involving multiple suppliers and customers, both internal and external to the organization. The challenge that hospitals face is coordinating all of its systems to work congruently to expedite a patient's discharge, yet ensure that the patient has everything he/she will need to care for him/herself post-discharge.

Midday capacity constraints result in long wait times for patients being admitted through the EC and may cause ambulance diversions. A survey conducted by the American Hospital Association showed the average waiting time for patients being admitted from the EC was 3.2 hours (Institute for Healthcare Improvement, 2004). A similar study performed at the BTGH revealed that patients waited an average of 4.3 hours for an inpatient bed (Seaman, 2003).

Ideally, admission is the most appropriate time to begin to plan for a patient's discharge needs. JCAHO mandates early identification of patient's discharge planning needs and the assessment of necessary resources to meet the patient's needs after discharge from a healthcare facility (Lile, 1998). Discharge planning is a process that begins with early assessment of anticipated patient care needs. Effective discharge planning requires input from numerous disciplines: physicians, nurses, case managers, dieticians, educators,

therapists and social workers. Coordinating these disciplines is one of the challenges hospitals face. Steele & Sterling (1992 as cited in Anthony & Hudson-Barr, 2004) described patient readiness for discharge as a "complex, multidimensional, multiphase phenomenon that provides an estimate of a person's ability to leave the hospital."

One of the most effective ways of ensuring that patients receive the necessary level of care throughout their hospital stay is to utilize case managers. On October 1, 2004, the Texas Medical Foundation, the Medicare Quality Improvement Organization of Texas, along with the Centers for Medicare & Medicaid changed the screening criteria they use to evaluate the appropriateness of admissions and procedures (Texas Medical Foundation, 2004). This change further necessitates the need for case managers to assist physicians in the admission process.

Research reveals a model of EC case management consisting of a social worker (SW) and a nurse case manager (NCM) can prevent inappropriate admissions, improve discharge planning, decrease cost, and enhance patient satisfaction (Bristow & Herrick, 2002). The EC NCM role is to perform clinical assessments and monitor the necessity for hospital admissions. The EC SW role includes performing psychosocial assessments, bereavement, and counseling. Having a NCM and SW in the EC facilitates early assessment and identification of the

patient's discharge planning needs from an holistic perspective (Bristow & Herrick, 2002).

Once a patient is admitted to an inpatient unit, an interdisciplinary team must work collectively to manage the patient's plan of care. "The coordination of care across the continuum decreases fragmentation, allows for effective utilization of resources, and contains costs" (Bristow & Herrick, 2002). Care pathways and discharge criteria are helpful and have been demonstrated to positively affect patient outcomes and may be instrumental in promoting effective discharge.

In a typical large teaching hospital the attending physician role is shared by numerous residents and interns, who sporadically care for multiple patients during their assigned shifts. Physician rounding times have a great impact on the time of day a patient is identified for discharge. Also, the time of day physicians write their discharge orders can vary based on their patient load, operating room schedules, or other academic requirements. Incentivizing physicians to identify potential discharge patients and complete discharge paperwork 24 hours in advance is crucial to expediting discharges. The Health Management Associates (HMA) (2004) reported that throughout the Dallas County Hospital District very few physicians submitted discharge orders by noon, which is the industry standard (The Advisory Board,

2003). It is also imperative that physicians have all the information necessary to discharge a patient. Specifically, laboratory results may impact a physician's decision to discharge a patient. Therefore, it is crucial that laboratory results are available to physicians in the early morning hours.

Upon identification for discharge and the completion of the discharge order, a team of nurses, nursing assistants, and clerks must collaborate to complete the physician's final discharge instructions. Once the patient has left the bed, the unit clerk must notify Bed Management of the vacant bed and housekeeping to clean the dirty bed. HMA (2004) reported that the Dallas County Hospital District experienced significant delays from the time the discharge order was written to the time the availability of the bed was reported in the hospital's computer system, often as many as six to nine hours.

Purpose

The purpose of this study is to identify impeding systematic delays in the patient discharge process, quantify the extent of the delays, and recommend potential performance improvement initiatives for the BTGH to expedite bed turnaround times, allowing patients to be admitted as inpatients quickly, and alleviate overcrowding in the EC which often results in ambulance diversions. This study will

specifically address bed turnaround times, discharge times of day, laboratory turnaround times, and utilization of the discharge holding area. This study will also determine if scheduling conflicts prevent certain systems from functioning at maximum efficiency.

Method and Procedures

Study Design

A pilot study was conducted on four inpatient nursing units at BTGH. Data were collected on two surgery units (4A & 4B) and two medicine units (6A & 6B) to determine the delays in discharging patients (N = 633). Statistical analyses were performed using the Statistical Program for Social Sciences (SPSS) and Microsoft Excel programs.

Interviews were conducted with staff nurses, resident physicians, nurse managers, assistant nurse managers, case managers, social workers, phlebotomists, pharmacists, nursing supervisors, patient flow coordinators, executive administrators, clothing clerks, housekeeping supervisors, unit clerks, and nurse educators. Extensive interviews with unit nurse managers and assistant nurse managers helped identify patient flow issues and complete a flow chart of the entire patient discharge process. In order to recognize and understand the complexity of the patient discharge process, a root cause analysis was performed to identify roadblocks and determine reasons for delays in the process.

According to Wilson, Dell, & Anderson (1993 as cited in Doggett, 2004) a root cause is the most basic rationale for a detrimental problem. Before an organization can take action to fix a problem, a root cause has to be identified. Without identifying the root problem, one is simply addressing the

symptoms of the problem, while the underlying problem continues to exist. Root cause analysis is a method that outlines each step in a process and traces each step back to determine the root cause. Christopher, Fernandes, Worster, Hill, McCallum, & Eva, (2004) outlined the three steps in root cause analysis as 1) to identify the causes of delay using a cause-and-effect diagram, 2) to collect data related to these potential causes, and 3) to discover root causes based on these data that explain their impact on the overall process.

Figure 9 outlines the steps in the patient discharge process at BTGH. In order to determine potential delays in the patient discharge process, data was collected at various steps in the process. Upon analysis of the data, the root causes were found and their impact on delaying efficient patient discharges was determined.

Events Measured

The data collected for this study were (a) initial diversion time of day, (b) physician rounding times, (c) time of day discharge orders were written, (d) patient discharge times, (e) bed cleaning times, (f) the time patients were transferred to the discharge holding area, (g) admission time of day and, (h) phlebotomist's blood draw times, and (i) laboratory test result times.

Diversion data were obtained from a monthly report completed by the BTGH EC staff. Diversion data were collected

from January 2004 through September 2004 (n = 62). Diversion data were specifically retrieved pertaining to only ambulance diversions initiated due to EC saturation pending open floor beds. Physician rounding times were obtained through interviews with surgery and medicine residents as well as nurse managers on inpatient units 4A, 4B, 6A, and 6B. A random sample of 82 records (n = 32 surgery records and n = 31 medicine records) was obtained to collect the time of day the discharge order was written and the room number and bed number from which the patient was discharged. Complete data were only available on 63 records, which were then used to determine total bed turnaround times.

Discharge times of day were obtained through a report from the HCHD Information Technology office. The report reflected all discharge times reported in the McKesson Patient Management® system for units 4A (n = 102), 4B (n = 149), 6A (n = 120), and 6B (n = 109). Bed cleaning times were obtained from the Environmental Services Bed Tracking® system.

Discharge holding data were collected for the month of August 2004 from a manual log book maintained by the assistant nurse manager in discharge holding. The data collected reflected the time of day (and the room and bed number) when the patient arrived in discharge holding from units

4A (n = 67), 4B (n = 12), 6A (n = 32), or 6B (n = 42) and the time of day the same patient was discharged from the holding area.

Four events were measured to determine bed turnover times according to the patient's unit, room number, and bed number: the time physician wrote discharge orders, the time the patient arrived in discharge holding, the time housekeeping was paged, and the time the bed was reported clean. Bed turnaround data were obtained from the Environmental Services Bed Tracking® System.

Admission times for the month of August were obtained through an electronic report from the HCHD Information Technology Office. The report reflected all admission times reported in the McKesson Patient Management® system for units 4A (n = 108), 4B (n = 147), 6A (n = 119), and 6B (n = 118).

The BTGH Chief Resident of Medicine identified two blood tests, the Complete Blood Count (CBC) and the Bone Marrow Plasma Cells (BMPC), as the most vital test results physicians need to discharge a patient. Laboratory data were collected from a report generated from the laboratory's MYSIS® software system. The report included all routine CBC (n = 297) and BMPC (n = 300) tests drawn by phlebotomists during an 8-day period from 11 through 17 October 2004 from units 4A, 4B, 6A, & 6B. The data collected were blood collection times, the time the laboratory received the data, and the time the test

results were available in the Clinipaq® software system for the physician.

Validity and Reliability

Admission and discharge data retrieved from HCHD's McKesson Patient Management® System and Laboratory MYSIS software system were obtained through electronic reports from both departments. The admission, discharge, and laboratory times were all generated automatically as staff performed the operation in the system; these times were not entered manually leaving very little chance for inaccurate or unreliable times. The data gathered from the discharge holding log book and the Environmental Services Bed Tracking® system was entered into SPSS and Microsoft Excel manually.

Results

BTGH went on ambulance diversion for saturation of its EC pending open inpatient floor beds a total of 62 times from January through September 2004. BTGH was on ambulance diversion for a total of 469.5 hours during this time period and each diversion period lasted on averaged 7.6 hours. The average time of day of initial diversion time was 14:08. Figure 1 displays the distribution of initial diversion times for January through September 2004.

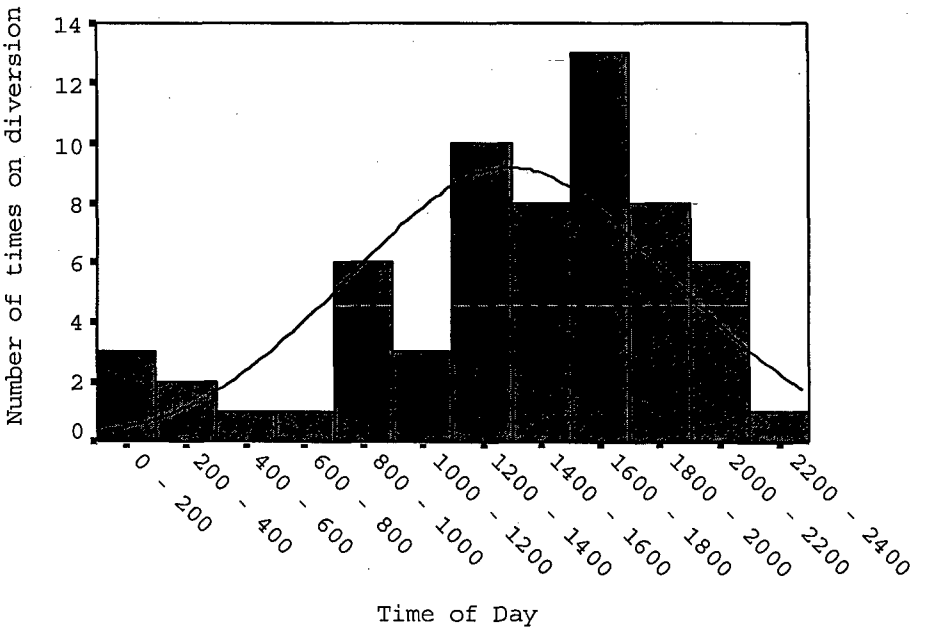

Figure 1. Time of Initial Emergency Center Diversion (n = 62) from January 2004 through September 2004. Diversion was initiated due to EC saturation pending open inpatient floor beds.

Surgery physicians conducted rounds on units 4A and 4B from 06:00 to 07:00. Medicine residents conducted rounds on units 6A & 6B between the hours of 09:30 to 10:30. The average time of day surgery physicians wrote a discharge order

n = 35) was 11:49. Figure 2 displays the distribution of times discharge orders were written on Surgery units 4A and 4B.

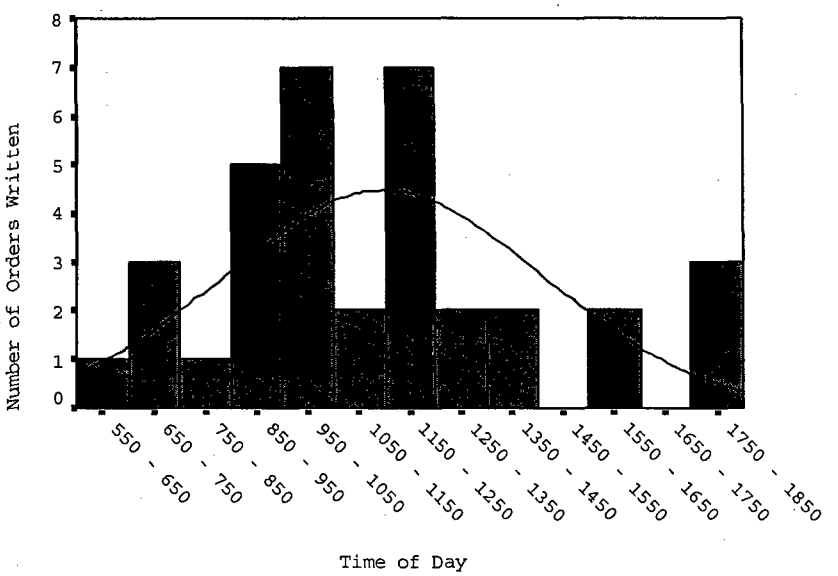

Figure 2. Time of day discharge orders (*n* = 35) were written on surgery units 4A and 4B during the month of August 2004.

The average time of day a surgery patient was discharged (*n* = 251) in the McKesson Patient Management® system was 16:06. Figure 3 displays the distribution of discharge times on Surgery Units 4A and 4B.

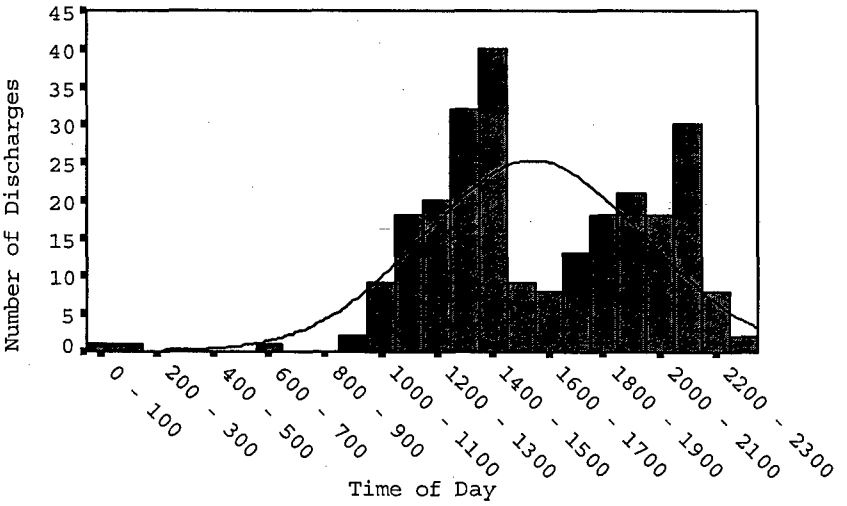

Figure 3. Time of day patients were discharged (*n* = 251) in the McKesson Patient Management® system on surgery units 4A and 4B during August 2004.

The average time of day a patient was admitted to a surgery unit (n = 254) was 13:33. Figure 4 displays the distribution of admission times for surgery units 4A and 4B.

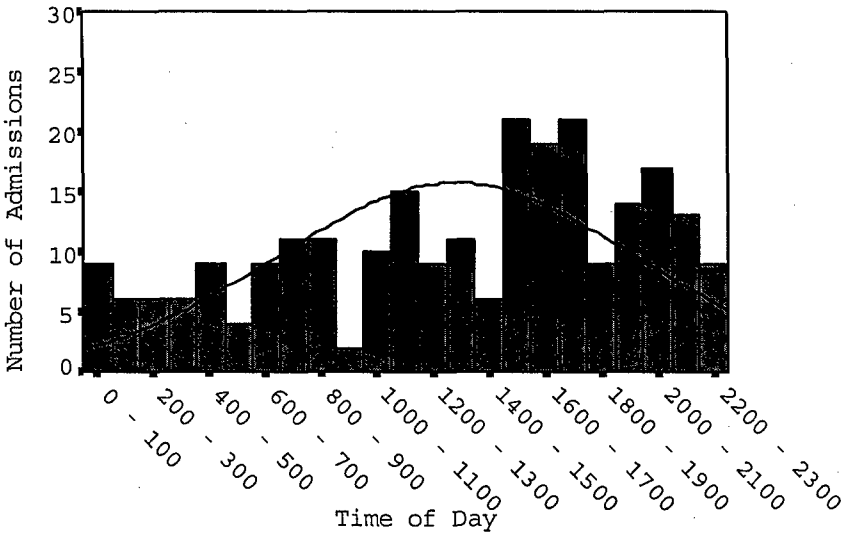

Figure 4. Time of day patients were admitted (n = 254) to surgery units 4A and 4B in the McKesson Patient Management® system

The average time of day medicine physicians wrote a discharge order (n = 43) was 13:33. Figure 5 displays the times discharge orders were written on medicine units 6A and 6B.

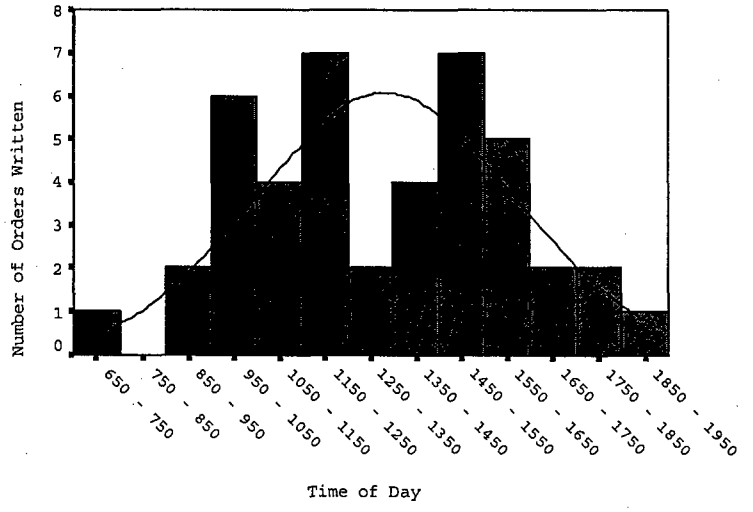

Figure 5. Time of day discharge orders (n = 43) were written on medicine units 6A and 6B during the month of August 2004.

The average time of day a medicine patient was discharged (n = 229) in the McKesson Patient Management® system was 16:35. The discharge times of day for medicine units 6A and 6B are displayed in Figure 6.

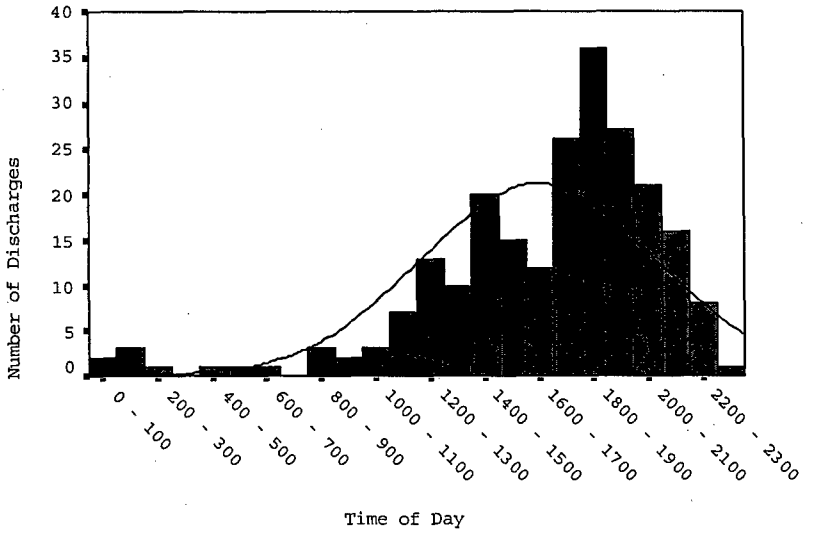

Figure 6. Time of day patients were discharged (n = 229) in the McKesson Patient Management® system on medicine units 6A and 6B during August 2004.

The average time of day a patient was admitted to a medicine unit (n = 237) was 13:03. Figure 7 shows the time of day patients were admitted to medicine units 6A and 6B.

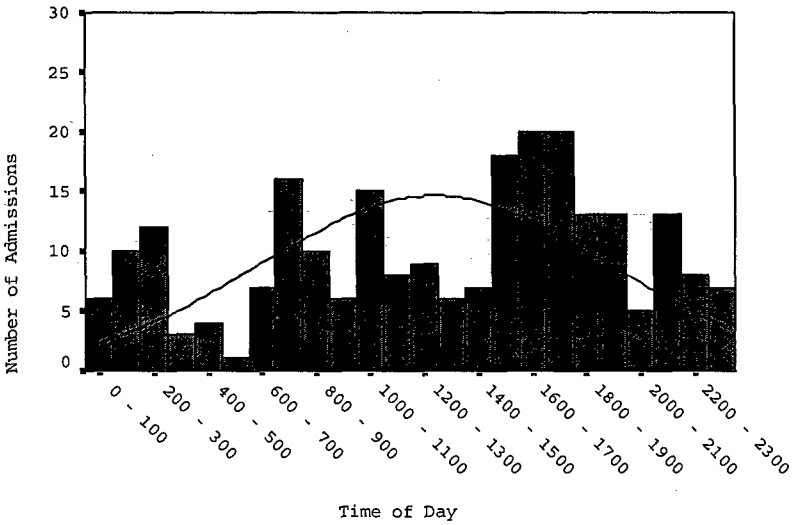

Figure 7. Time of day patients were admitted (n = 237) to medicine units 6A and 6B in the McKesson Patient Management® system during August 2004.

The percentage of total discharges entered into the McKesson Patient Management® system before 12:00, the industry standard (The Advisory Board, 2003), were 10% for both medicine units 6A and 6B, 16% for 4A, and 17% in 4B. Percentages for all discharge times for the four units are shown in Figure 8.

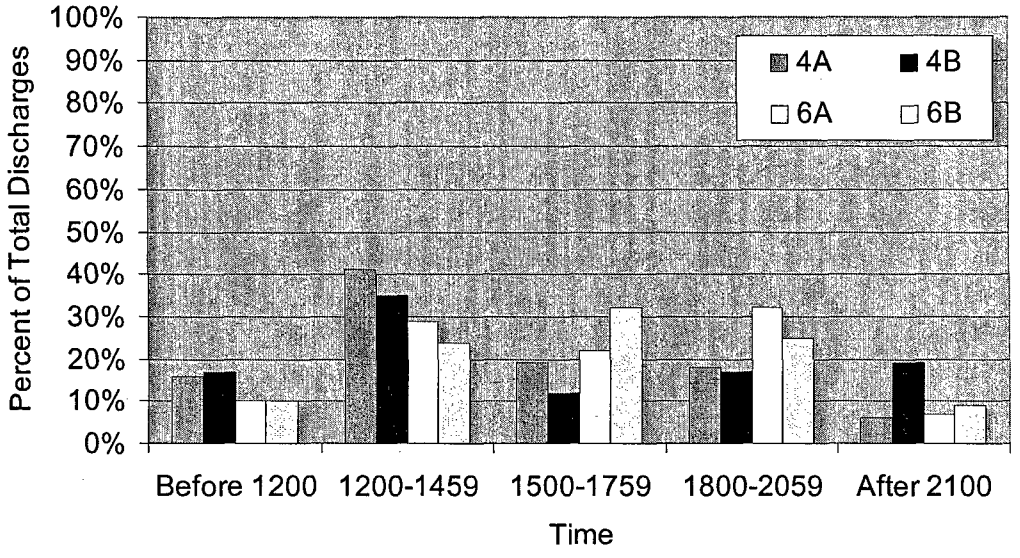

Figure 8. Percentage of discharges (N = 633) occurring during different periods of the day from surgery units 4A and 4B and medicine units 6A and 6B during August 2004.

The average time from the discharge order written to the time a bed was reported clean was 307 minutes on surgery units 4A & 4B (n = 32). The average time from discharge order written to bed clean on medicine units 6A & 6B was 238 minutes (n = 31). The average time a bed was dirty before the dirty bed was reported to housekeeping was 56.8 minutes on the surgery units and 52.4 minutes on the medicine units. Table 1 shows the percent of calls made to housekeeping within 15, 30, and 45 minutes once the bed was vacated.

Table 1
Time Lapse Between Bed is Vacated and Bed is Reported Dirty to Housekeeping

Unit	Average Time to Call	% Calls Within 15 minutes	% Calls Within 30 minutes	% Calls Within 45 minutes
Surgery[a] 4A& 4B	56.8 minutes	6%	50%	59%
Medicine[b] 6A & 6B	52.4 minutes	3%	26%	55%

[a]n = 32; [b]n = 31

The discharge holding area was utilized by all four inpatient nursing units throughout the month of August 2004. Unit 4A sent 40% of its discharges to discharge holding while unit 4B only sent 7% of its discharges to the holding area. The medicine units, 6A and 6B, utilized the discharge holding area for 21% and 28% of its discharges, respectively. Patients arriving in the discharge holding area from 4B stayed the longest at an average of 194 minutes; patients arriving from 4A stayed an average of 122 minutes. Patients from the

Table 2
Discharge Holding Area (DHA) Utilization for August 2004

Unit	Transfers to DHA	Total Discharges	Utilization	Average Length of Stay in DHA
4A	67	169	40%	122 minutes
4B	12	161	7%	194 minutes
6A	32	152	21%	152 minutes
6B	42	151	28%	157 minutes

medicine units, 6A and 6B, stayed an averaged of 152 minutes and 157 minutes respectively.

Laboratory blood draws for all routine CBC tests (n = 297) performed on patients in the four nursing units were received in the laboratory on average within 1 hour 20 minutes and results available on average within 1 hour 14 minutes after the blood sample was received. The average time of day the blood was collected for a CBC test was 07:48 and the average time of day the blood was delivered to the laboratory was 09:02. The test results were available to the physicians at an average time of 10:22.

BMPC blood draws arrived within an average time of 1 hour 7 minutes and results were available on average within 1 hour 14 minutes after the blood sample was received. The average time of day the blood was collected for a BMPC test was 07:54 and the average time of day the blood was delivered to the laboratory was 09:09. The test results were available to the physicians at an average time of 10:16. Tables 3 and 4 display the descriptive statistics for the CBC and BMPC routine tests from the time the blood was collected, received in the lab, and resulted.

Table 3
Time Lapse Between Blood Collection and Blood Received in the Laboratory

Test	Mean	Std. Dev.	Min	Max
CBC_a	1:20	0:51	0:12	5:52
$BMPC_b$	1:07	0:22	0:26	3:22

[a]*n* = 297; [b]*n* = 300

Table 4
Time Lapse Between Blood Received in the Laboratory and Results Available for Physicians

Test	Mean	Std. Dev.	Min	Max
CBC_a	1:14	0:46	0:01	3:18
$BMPC_b$	1:14	0:47	0:01	3:18

[a]*n* = 297; [b]*n* = 300

Discussion

A root cause analysis of the entire discharge process revealed that the McKesson Patient Management® System is not updated in a timely manner to display an accurate bed status for inpatient nursing units, thus impeding patient flow from the EC. On a daily basis at BTGH, Bed Management (Admissions) works diligently over the phone conversing with inpatient nursing units and Nursing Supervisors to find empty beds to fill with the constant influx of patients waiting in the EC. This current process is extremely inefficient and time consuming for all involved. Quite frequently, Bed Management will report there are no open beds in BTGH and will seek the help of the House Nursing Supervisors to perform walk-throughs to find empty beds. When asked, Nursing Supervisors are consistently able to identify numerous empty beds throughout the facility. The reason for this occurrence is the McKesson Patient Management® System, which Bed Management uses to search for empty beds does not always reflect the actual, updated bed availability of the units. Exactly half of the 62 times diversion status was initiated fell between the hours of 12:00 and 18:00. This event occurs because a large majority of patients are being discharged in the afternoon and evening hours, leaving a significant gap in bed availability when the peak admission times are in the afternoon hours of the day. With the average discharge time falling later than the average

admission time, Bed Management must work frantically to locate potential vacant inpatient floor beds.

Surgery residents are clearly writing discharge orders earlier than medicine residents. Surgery residents perform their discharge rounds at approximately 06:00 on 4A and 06:30 on 4B and often return to write the discharge orders within a few hours. The majority of discharge orders were written on the surgery units before 12:00. On the contrary, the medicine residents conduct teaching rounds at approximately 09:30 on 6A and 10:00 on 6B. Nursing staff on both medicine units call all of their residents daily prior to 08:30 to identify potential discharges, but consistently the residents do not identify patients at this early time. Earlier discharge rounding times for medicine residents is not advantageous because the majority of the blood test results are not available until approximately 10:30 or even later. Because only teaching rounds are performed in the morning, discharge rounds are not usually conducted until after 12:00. Therefore, the majority of discharge orders written by medicine physicians are after 12:00 (70% of them on 6A & 6B).

When reviewing the distribution of discharge times for all four units, it is apparent that the bulk of discharges in the Patient Management® System are occurring after 12:00. Unit 4A discharged 19% of their patients after 21:00, which is very concerning because discharge orders on surgery units were

written much earlier in the day. Admissions occurred throughout the day and night on all four units, but a large majority of them occur in the afternoon and evening when inpatient beds are being vacated by discharged patients. Significant opportunities for earlier discharges exist on both surgery and medicine units, which can alleviate overcrowding and delays in patient flow from the EC.

Once a patient vacated an inpatient bed, it took the unit clerk or nurse an average of 56 minutes to call housekeeping to clean the dirty bed. Table 5 shows the bed turnover performance indicators for BTGH. When compared to the standards presented by the University HealthSystem Consortium (2002) the surgery units rank well below the 50th percentile and the medicine units fall between the 75th and 50th percentile.

Table 5
Bed Turnover Performance Indicators

Measure	Process Times	50th Percentile	75th Percentile	90th Percentile
Average time from order written to room clean (surgery: 4A & 4B)	307 min	251 min*	211 min*	175 min*
Average time from order written to room clean (medicine: 6A & 6B)	238 min	252 min*	226 min*	197 min*

*Comparisons were obtained from the 2002 University HealthSystem Consortium Managing Patient Flow Benchmark Study

Another significant problem identified in the discharge process is that inpatient unit nurses and clerks call in multiple beds at one time to the housekeeping staff and overwhelming them with dirty beds to clean, often times right before a shift change (15:30). Additionally, not all beds are called into the Bed Tracking® system, which eliminates the ability to accurately track the housekeeping staff's workload in order to determine the appropriate allocation of human resources. Another significant problem is that Bed Management does not have access to the Bed Tracking® system and therefore, must constantly call the nursing units for an updated status of a dirty bed.

Fortunately, for the BTGH, a new bed tracking system will be purchased and available to all personnel in the hospital via the Internet. The addendum to the housekeeping contract will include training for all hospital personnel who will utilize the bed tracking system. This will be an ideal opportunity to retrain all staff on the importance of calling in all dirty beds for housekeeping staffing effectiveness and bed tracking purposes. The new system will also allow managers and house supervisors to monitor bed status and conduct census accuracy reports.

The literature shows that discharge holding areas across the nation have not been used for their original intent, which is simply a waiting area for patients who are awaiting

transportation. The discharge holding area at BTGH has often been misused as a dumping ground for patients who still require education and significant amounts of documentation of their clinical care. The results of this study revealed the discharge holding area is significantly underutilized by 4B (7% of their patients go to the discharge holding area), yet of those units who are utilizing the discharge holding area, quite frequently misuse the area.

Housekeeping staff on the evening shift need to be reallocated to share the workload. For instance, during the evening shift from 15:30 to 11:30 only one housekeeper is responsible for three Intensive Care Units (ICU's) which are constantly rotating patients in and out of the units while another housekeeper is responsible for two inpatient nursing floor units and a clinic. The workload should be reallocated to share appropriately distribute the intense load of managing the cleaning needs of the ICU's. Additionally, housekeeping discharge teams should be established to tackle the discharges and improve bed turnaround times. Once the new Bed Tracking® system is implemented, hospital personnel will be have the ability to better track bed cleaning times and can hold the housekeeping staff to their standard cleaning times: 20 minutes for stat cleaning and 30 minutes for routine cleaning (isolation rooms require extensive cleaning which can take up to 45 minutes).

Laboratory blood draws are vital for physicians to make a discharge decision. Early morning tests results are imperative for surgery and medicine residents to write discharge orders early enough to expedite patient discharges before 12:00. The BTGH laboratory provided CBC and BMPC test results on average around 10:20. These late result times lead to discharge orders being written at later times, which potentially delays patients in the EC who are waiting for an empty inpatient bed.

Because the patient discharge process is so cumbersome, there are currently numerous other projects in progress at BTGH that will impact the efficiency of patient flow through the hospital. On October 4, 2004, a new HCHD Case Management program was implemented at BTGH which combined Social Workers and Clinical Case Managers under one authority and utilized them for the first time in the EC to identify patient discharge needs immediately upon the decision to admit a patient. The Pharmacy faxing pilot project allows nursing units to fax a patients discharge prescription to the EC pharmacy immediately upon receipt of the discharge orders to allow the pharmacy time to fill the prescription, reducing the time the patient waits for his/her prescriptions. A patient Clothing Committee was established in November 2004 to review the process of how patient clothing is received in the EC, inventoried, and delivered to the patient once they are

admitted to an inpatient nursing unit. Lastly, a Discharge Supply Standardization Committee is working diligently to standardize discharge supplies so that physicians know the amount and type of supply the physicians are authorized to prescribe a patient upon discharge.

Recommendations and Conclusions

The timing of this study could not have been more ideal. This study will be extremely useful for the BTGH executive leadership as they prepare to comply with the new JCAHO Standard LD.3.15, Managing Patient Flow, which goes into effect January 1, 2005. This study, coupled with the 2003 study on admission delays in the EC (Seaman, 2003) will be very useful for BTGH to implement plans to continuously monitor and mitigate delays in patient throughput.

In order to continuously monitor patient flow, the organization should establish a Patient Flow Committee that convenes the key stakeholders throughout the entity whose daily decisions directly affect patient throughput: Administrator, Patient Flow Coordinator, Medical Staff, Laboratory & Radiology, Patient Transportation, Bed Management, Case Management, Ambulatory Services, Emergency Center, Environmental Services, Facility Engineering & Biomedical Engineering, and Environmental Services. Another valuable initiative from the literature is to establish morning bed management huddles, which involve clinical staff members who directly affect patient flow to discuss each unit's bed availability and plan ahead for the potential workload challenges.

BTGH staff needs to regularly collect, measure, and report key performance indicators and set targets for

continuous improvement of bed turnaround times on all nursing units as well as the EC and any other units that patients may flow through. A data analyst will be needed to continuously monitor bed turnover times and discharge times of day for BTGH. These indicators should be reported to leadership on a regular basis to support planning efforts for efficient patient flow and to ensure compliance with JCAHO standards.

The BTGH needs to establish a discharge time of day that the entire organization should strive to meet. The discharge holding area should be renamed the "Discharge Lounge" to signify its intended purpose which is simply an area for patients await transportation. The unit nurse manager should conduct unit census accuracy reports weekly, which compare the unit's bed status in the McKesson Patient Management® System with the unit's actual bed availability.

Recently the BTGH laboratory acquired three new analyzers, which will significantly improve laboratory turnaround times. A reassessment of laboratory turnaround times should be conducted to determine exactly what time of day phlebotomists need to draw blood in order to have test results available to physicians as early as 06:00 for surgery units and 07:00 for medicine units.

The utility of this study will be extremely valuable to BTGH leadership and staff. By addressing the root causes of delays in the discharge process and collaborating amongst all

key stakeholders in the process, the BTGH will continuously improve patient throughput by streamlining its discharge process. These improvements will help avoid admission delays and ambulance diversion. Ultimately, a streamlined discharge process will lead to real-time reports on bed availability and enhance efficient patient flow. Additionally, improving the patient discharge process can potentially increase patient and employee satisfaction. By improving the discharge process, BTGH will most likely have a profound impact on overall patient flow through BTGH.

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Appendix

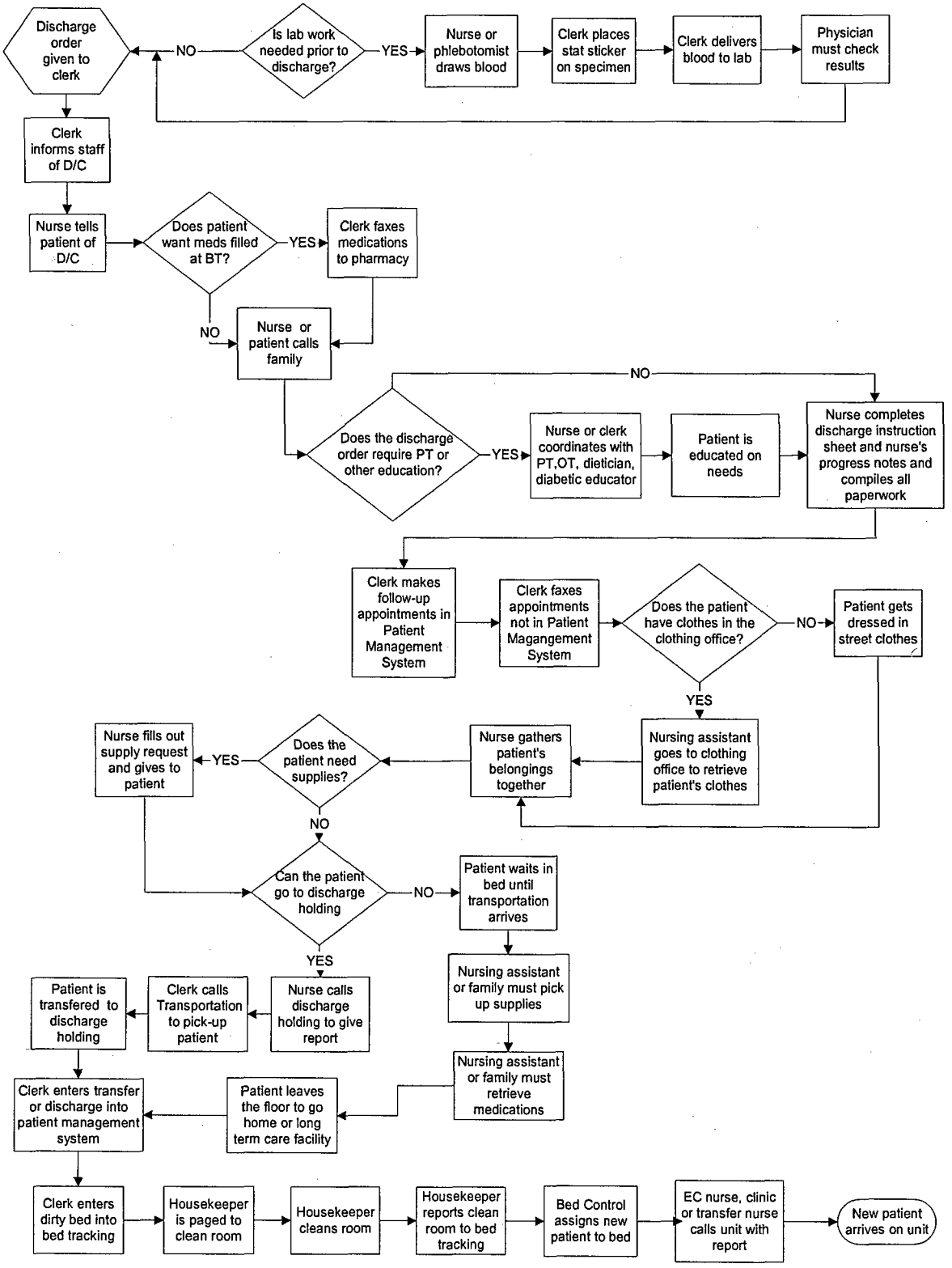

Figure 9. Medical/Surgical Patient Discharge Process